

# APPROVAL SHEET FOR SUSPENDED LOAD OPERATIONS

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TITLE REMOVAL OF ROAP FROM TRANSPORTATION SUPPORT STURCTURE INTO CARRIAGE ASSEMBLY.

DOCUMENT NUMBER/TITLE TPS-SS-SSPF-ACCESS-T0007, RT# MV373, ROAP VENDOR SUPPORT ACTIVITIES.

PREPARED BY CASE VAN DYKE

DATE 2 MAY 1995

## REQUIRED APPROVAL

CONTRACTOR	<input type="checkbox"/> DESIGN	<input type="checkbox"/> R & QA	<input checked="" type="checkbox"/> OPERATIONS	<input checked="" type="checkbox"/> SAFETY
NASA	<input type="checkbox"/> DESIGN	<input type="checkbox"/> R & QA	<input type="checkbox"/> OPERATIONS	<input checked="" type="checkbox"/> SAFETY

TYPE OR PRINT NAME	SIGNATURE	ORGN.	DATE
DARRYL FRANK	<i>m. Glenn for</i>	RT-SRD	5/2/95
MALCOLM GLENN	<i>m. Glenn</i>	RT-SRD-1	5/2/95
KRISTINE ERBILLEN	<i>Kristine Erbil</i>	A91-F292	5/2/95
WENDY D. ZIRNFUS	<i>Wendy D. Zirnfus</i>	A91-F670	5/2/95
Keith Castillon	<i>Keith Castillon</i>	CMWT32	5/2/95

CONTRACTOR DIRECTOR OF SAFETY

**NASA SUSPENDED LOAD OPERATION  
ANALYSIS/APPROVAL**

NUMBER:

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**OPERATION**

1. To remove U-Bolt assemblies from the Removable Overhead Access Platform (ROAP) support structure.
2. Position the ROAP onto carriage assembly.

These operations will be conducted one time only under this SLOAA report.

**SUPPORTING DOCUMENTS** - The associated operational procedure and System Assurance Analysis (SAA) is as follows:

- TPS-SS-SSPF-ACCESS-T007, RT# MV373, ROAP Vendor Support Activities
- SAA21CRS1-001, 30 Ton Highbay Bridge Cranes - Space Station Processing Facility (SSPF)

**GENERAL DESCRIPTION**

1. Removal of the ROAP from transportation support structure requires four persons to be partially under the suspended ROAP to remove four (4) U-Bolt assemblies.
2. Positioning of the ROAP onto the carriage assembly requires four persons to be partially under the suspended ROAP.

These tasks require personnel to be in the area of increased hazard directly under the suspended load for the ROAP operations. TPS-SS-SSPF-ACCESS-T007 is the controlling procedure used in the SSPF for these operations but will temporarily be deviated to facilitate SSPF operations.

**RATIONALE/ANALYSIS** - The suspended load tasks comply with the NASA Alternate Safety Standard as follows:

**Alternate Standard Requirement #1a:**

During removal of the ROAP from the support structure the technicians must be directly beneath the suspended load. There is no alternate access to the U-Bolt fittings located underneath the ROAP. This physical limitation precludes any design, operational, or procedural changes that would eliminate personnel exposure to a suspended load.

**Alternate Standard Requirement #1b** - The possible use of a secondary support system, to catch the load in the event of a crane failure, was analyzed. It was determined that the use of a secondary support system was not feasible because of positioning of the ROAP.

**Alternate Standard Requirement #1c**

- Four persons are allowed under the suspended ROAP to remove the U-Bolt fittings.
- Four people are allowed under the ROAP to position it onto the carriage assembly.

**Alternate Standard Requirement #1d**

- Removing U-Bolt fittings from the ROAP support structure will take four persons (two per fitting) up to 10 minutes to ensure the payload is free of support structure.
- Positioning the ROAP onto the carriage assembly will take four persons up to 60 minutes to manually install the bolts and translate the weight during the test.

**Alternate Standard Requirement #4** - TPS-SS-SSPF-ACCESS-T007 permits only the approved number of persons under the suspended loads addressed in this analysis. The TPS is available on site for inspection during the operation.

**Alternate Standard Requirement #6** - The suspended load operations addressed in this analysis involve one of the 30 ton SSPF bridge cranes. The cranes are designed, tested, inspected, maintained, and operated in accordance with the NASA Safety Standard for Lifting Devices and Equipment, NSS/GO-1740.9.

The 30 ton crane hoists are equipped with two magnetic holding brakes, each capable of holding the load up to the crane's rated capacity. Each brake's ability to hold the rated load (30 tons) is verified annually. The cranes are designed to meet a 5 to 1 safety factor based on ultimate strength for the hoist load bearing components. The 30 ton cranes are load tested annually at 100% of their rated capacity. Detailed preventive maintenance is performed monthly, quarterly, semiannually, and annually on the cranes to ensure proper operation. A detailed inspection of the lifting slings is performed annually. Nondestructive testing of the slings and crane hooks is performed annually.

The weight of the ROAP is 12,000 lbs, which is 20% of the crane's capacity. The lifting sling is rated at 40 tons and is designed to meet a 5 to 1 safety factor based on ultimate strength.

**Alternate Standard Requirement #7** - An SAA has been completed on the 30 ton bridge cranes in the SSPF. The SAA includes a Failure Modes and Effects Analysis/Critical Items List (FMEA/CIL) and a hazard analysis (see supporting documents). No critical single failure points were identified during this analysis.

**Alternate Standard Requirement #8** - Visual inspections for cracks or other signs of damage or anomalies are performed on the hoist hooks, hoist beams, hoist cables, hoist rod assemblies, and hoist fittings, and crane functional checks are performed before each operation per NSS/GO-1740.9.

**Alternate Standard Requirement #9** - Trained and licensed crane operators shall remain at the hoist controls while personnel are under the load.

**Alternate Standard Requirement #10** - Appropriate safety control areas are established before initiating operations. Only the minimum number of people (manloaded in the procedure) will be permitted in this area.



**Alternate Standard Requirement #11** - A pretask briefing and a safety walkdown of the area is conducted prior to the lift to ensure that all systems and personnel are ready to support. All participants are instructed on their specific tasks and warned of any hazards involved. Following any crew change, the new personnel are instructed by the task leader on their specific tasks and warned of any hazards involved.

**Alternate Standard Requirement #12** - Personnel beneath the suspended load will be in voice contact with the hoist operator and/or task leader. Upon loss of communication, the operation shall stop immediately, personnel shall clear the hazardous area, and the load shall be safed. Operations shall not continue until communications are restored.

**Alternate Standard Requirement #13** - Personnel working beneath the load shall be in continuous sight of the hoist operator and/or task leader.

APPROVAL:

DATE:

*for Bruce L. Jensen*  
Joel R. Reynolds  
Acting Director, Safety  
and Reliability (RT)  
Kennedy Space Center